



National Aeronautics and
Space Administration

Washington, DC 20546

SAFETY AND MISSION ASSURANCE Strategic Plan

Safety, Reliability, Maintainability, and Quality are integral to NASA's quest to expand frontiers in aeronautics and space.

April 19, 1996

Safety and Mission Assurance Strategic Plan Overview

Vision

Safety, Reliability, Maintainability, and Quality are integral to NASA's quest to expand frontiers in aeronautics and space.

Mission

To assure the safety and enhance the success of all NASA activities.

Goals

Early integration and *life-cycle implementation of safety, reliability, maintainability, and quality assurance (SRM&QA)* into NASA's programs and operations.

Thorough and expeditious *independent assessments* of program/project safety, reliability, maintainability, and quality.

Innovation and rapid transfer of SRM&QA technologies, processes, and techniques to reduce the costs of mission success.

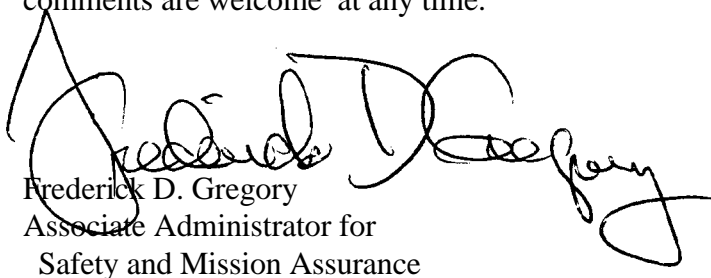
Application of Risk Assessment Methodologies to provide relevant, practical, and timely contributions to NASA's management of risk.

Development of a Safety and Mission Assurance (S&MA) Team which is highly motivated, trained, and properly equipped.

Planning for Success

This Strategic Plan is both evolutionary and revolutionary. It builds on our previous plan and better supports the needs of our primary customers, NASA's Strategic Enterprises¹. It reflects the efforts to revolutionize NASA. This Plan is the map for achieving our SRM&QA² goals of early integration, innovation, application of risk assessment, and development of an S&MA² team as a means for assuring the safety and enhancing the success of NASA's programs and operations.

Strategic planning is a continuous and iterative process. In order to reach our goals, we must adapt to customer needs and a changing external environment. To ensure that this Strategic Plan remains current and relevant, we will continually assess our progress and make needed adjustments. Your recommendations or comments are welcome at any time.



Frederick D. Gregory
Associate Administrator for
Safety and Mission Assurance

¹See NASA Strategic Plan.

²As used in this Plan, S&MA refers to the NASA-wide Safety and Mission Assurance *organization* and SRM&QA refers to the engineering and management *disciplines* of safety, reliability, maintainability, and quality assurance.

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Vision

Safety, Reliability, Maintainability, and Quality are integral to NASA's quest to expand frontiers in aeronautics and space.

Mission

To assure the safety and enhance the success of all NASA activities.

Goals

Life Cycle Implementation of SRM&QA

Early integration and *life cycle implementation of safety, reliability, maintainability, and quality assurance (SRM&QA)* into NASA's programs and operations.

Effective integration of SRM&QA into programs and operations will result in:

- ★ *Improved safety and quality* of programs, operations, and facilities;
- ★ *Faster identification, analysis, communication, and resolution of issues* which can adversely impact safety and mission success;
- ★ *First time quality* in the planning, design, development, fabrication, test, verification, and operation of systems;
- ★ *Reduced costs* of mission success.

Independent Assessment

Thorough and expeditious *independent assessments* of program/project safety, reliability, maintainability, and quality.

Independent assessments will result in:

- ★ Added confidence in the safety and mission integrity of NASA programs/projects.
- ★ Identification of problems/issues that might otherwise have gone unnoticed until they resulted in a mishap or failure.

SRM&QA Innovation and Rapid Transfer

Innovation and rapid transfer of SRM&QA technologies, processes, and techniques to reduce the cost of mission success.

Innovation and rapid transfer will result in:

- ★ *Robust designs and operations* which increase the probability of mission success;
- ★ *Faster development and earlier application of state-of-the-art SRM&QA technologies, tools, and techniques*;
- ★ *State-of-the-art SRM&QA technologies, tools, and techniques* made available to other government agencies, academia, and the commercial sector.

Application of Risk Assessment Methodologies

Application of Risk Assessment Methodologies to provide relevant, practical, and timely contributions to NASA's management of risk.

Application of risk assessment methodologies will result in:

- ★ Use of *risk assessment* as a visible input to management decision-making;

- ★ *Quantitative risk assessment* techniques which are commonly understood, accepted, and used where appropriate;
- ★ *Timely, adequate, and appropriate SRM&QA information* to support decision-makers.

Development of the S&MA Team

Development of a Safety and Mission Assurance (S&MA) Team which is highly motivated, trained, and properly equipped.

Development of the S&MA team will result in:

- ★ *Increased productivity, superior performance, and excellence;*
- ★ *Greater opportunity for job satisfaction, empowerment, teamwork, and challenge;*
- ★ *A highly qualified, multi-disciplinary, and diverse S&MA workforce;*
- ★ *Corporate knowledge* that is continually maintained, expanded, and updated.

Environmental Context

NASA personnel share with the Administration, Congress and the public a concern for the continuing safety and success of NASA's missions. This will necessitate that NASA maintain a robust independent assurance function. A catastrophe affecting a highly visible program such as the Space Shuttle, the Space Station, or another major national asset in NASA's possession has the potential to seriously impede NASA's ability to accomplish its mission. The environment in which we must work requires an effective and efficient SRM&QA program.

International

Global Commerce and Cooperation. As global economic competition intensifies, customers will demand increasingly higher quality products and services. International cooperative efforts present unique challenges in integrating SRM&QA requirements. Improved mission assurance tools and techniques are required to advance the U.S. competitive position in the aerospace marketplace.

Information Infrastructure. The global information "superhighway" is important to U.S. participation in the global marketplace. New networking technologies will allow decision-makers easier access to safety, mission assurance, and risk management information. Electronic access to this information will facilitate management efficiencies.

Governmental

National Performance Review and Performance-Based Standards. Federal agencies are eliminating many detailed "how to" standards and specifications, resulting in contractors operating with fewer government-imposed standards. As agency-specific standards are being replaced by national and international standards, the government needs to identify the minimum and essential SRM&QA requirements to retain hard won lessons learned from past experience. The government will increasingly rely on the use of performance-based contracts.

Resources

Constrained Budgets. Government budgets can be expected to decrease in the foreseeable future, thus driving the need to reduce the cost of mission success and increase the efficiency of SRM&QA processes.

Changing Workforce. The aerospace industry and the Federal government are faced with the challenge of filling critical jobs with technically qualified people, while reducing staff. Downsizing results in a loss of unique technical skills and corporate knowledge, including those of SRM&QA.

Management

Management and Engineering. Evolving technologies are reducing product development life cycles, resulting in less reliance on inspections and more on rigorous and complete systems engineering practices and process verification. Industry and government are implementing advanced quality concepts and concurrent engineering techniques to effectively integrate safety, reliability, maintainability, and quality into all phases of a product's life cycle. This changing environment will necessitate the development and introduction of new SRM&QA tools, techniques, and processes in government, industry, and academia.

Increased Risk. The pursuit of faster, better, and cheaper programs may drive the need to consider accepting higher levels of risk in the future. Therefore, decision-making must be supported with improved methodologies for risk identification, assessment, and recommendations for mitigation and acceptance.

Strategies

This Strategic Plan commits S&MA to the following strategies during the period from 1996 to 2002:

Independently assess NASA programs, projects, and facilities by:

- ★ Independently reviewing and evaluating developmental and operational programs/projects in conjunction with Program Management Council (PMC) milestone reviews at HQ and at Centers;
- ★ Expanding the S&MA Pre-launch Assessment Review (PAR) process across the Human Exploration and Development of Space (HEDS) Enterprise to include International Space Station launch, assembly, and on-orbit operations;
- ★ Independently reviewing and evaluating the SRM&QA processes within the Strategic Enterprises.

Effectively communicate risk issues by:

- ★ Improving channels for communication between S&MA and program management;
- ★ Maintaining the direct access of Center S&MA Directors to their Center Directors;
- ★ Maintaining independent access of Center S&MA Directors to the Associate Administrator (S&MA), and subsequent access to the Administrator;
- ★ Maintaining an anonymous safety reporting process while promoting cultural changes that will reduce the need for anonymous reporting in the future.
- ★ Maintaining effective communications between the AA(OSMA) and Center S&MA Directors.

Help to reduce the costs of mission success by:

- ★ Establishing policies that define the minimum set of S&MA requirements applicable to Centers and programs/projects;
- ★ More effectively executing the SRM&QA disciplines in the systems engineering process (which includes treatment of both hardware and software in an integrated manner);
- ★ Promoting the application of innovative, tailored, results-oriented SRM&QA approaches versus rigid standards;

- ★ Establishing criteria and methods for formal risk acceptance by program/project managers at critical life cycle milestones;
- ★ Assisting program management to apply lessons learned to programs and projects and ensuring that appropriate lessons learned are documented;
- ★ Implement advanced quality concepts and concurrent engineering techniques to effectively integrate safety, reliability, maintainability, and quality into all phases of a product's life cycle.

Improve program/contractor problem reporting and data integrity (accuracy, completeness, and security) by:

- ★ Analyzing and streamlining the problem reporting process and establishing criteria and methods for effective and efficient problem documentation, analysis, and resolution by program management;
- ★ Establishing the capability for problem reporting to support quantitative risk assessment.

Identify and sponsor the development and introduction of new and innovative technologies that result in systems with improved safety and reliability and reduced costs by:

- ★ Establishing relationships with NASA Strategic Enterprises for the transfer of SRM&QA technologies, tools, and techniques;
- ★ Working with other government agencies, academia, and the commercial sector for the exchange of SRM&QA technologies, tools, and techniques.

Enhance the SRM&QA skills, knowledge, and abilities of NASA personnel by:

- ★ Developing, institutionalizing, and continually improving a comprehensive training and career development program for NASA S&MA professionals;
- ★ Coordinating related training with program, project, and functional management;
- ★ Committing S&MA management support for training and career development efforts.

Implement a viable process verification program (with metrics) for:

- ★ Managing, assessing, and improving internal S&MA processes;
- ★ Assessing program/contractor processes as they relate to safety, reliability, maintainability, and quality.

Enterprise-specific Key Issues

As NASA transitions to new, more efficient and effective ways of conducting its missions, the role of S&MA will change. The issues listed below reflect these changing roles. S&MA organizations will focus on these key issues in support of the Strategic Enterprises.

- ★ The need for S&MA to support the paradigm shift from oversight of, to insight into, contractor processes.
- ★ Development of effective Mission Assurance for better, faster, cheaper spacecraft projects.
- ★ Development of an appropriate, tailored, and effective role for S&MA in a technology-based enterprise.
- ★ Development of an effective Facility Assurance program.

Customer Support Framework

The internal customers of S&MA are the NASA Administrator, the Strategic Enterprises, and the organizations supporting them with Crosscutting Processes. External customers and stakeholders are the commercial sector, academia, other government agencies, and the Congress. S&MA works in partnership with its primary customers to implement balanced, tailored, appropriate SRM&QA programs that will assure mission success within resource and schedule constraints. This support is provided in three major areas:

- ★ Policy, Process, and Standards Development
- ★ Oversight to Insight
- ★ Technology Development and Transfer

Policy, Process, and Standards Development. S&MA solicits customer feedback to support development or modification of policies, processes, and standards, and works with its customers to tailor these documents to specific programs. S&MA will remain cognizant of national as well as international regulations, codes, policies, and standards to support customer needs.

Oversight to Insight. S&MA is transitioning from oversight to insight while continuing to ensure the safety and enhance the success of NASA programs and operations. Insight includes monitoring compliance and evaluating the effectiveness of policies, processes, standards, and requirements that impact safety, reliability, maintainability, and quality. Problem reports, trend analyses, mishap reports, independent assessments, functional management reviews, lessons learned, and the established metrics are key sources of data for the insight function.

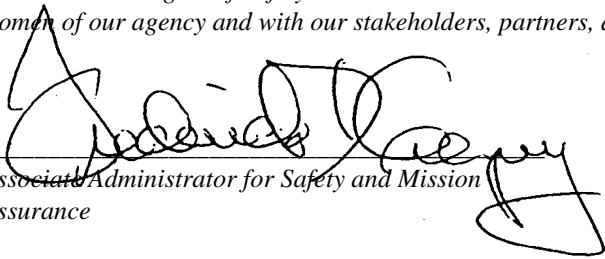
Technology Development and Transfer. S&MA advocates and sponsors the development of tools, techniques, methodologies, and innovative solutions to specific problems that concern safety, reliability, maintainability, and quality for our customers. S&MA works with its customers to plan, evaluate, and transfer technology.

Acronyms/Glossary

Insight	An indirect process of gathering a minimum set of product or process data (usually by means of audit or surveillance) that provides adequate visibility into the integrity (stability) of the product or process.
Oversight	A process of gathering product or process data through on-site, in-series involvement (usually inspection) in the process to assure the integrity (stability) of key product or process characteristics.
PAR	Pre-launch Assessment Review. A pre-launch process consisting of multiple reviews conducted by S&MA to independently assess the safety and flight readiness of a Space Shuttle mission and to prepare the AA(OSMA) to co-chair the Flight Readiness Review.
PMC	Program Management Council, as established by NMI 7120.4 and NHB 7120.5.
S&MA	Safety and Mission Assurance. As used in this plan, S&MA refers to the <i>organization</i> , i.e., the offices and people at all NASA centers and Headquarters who support customers with policy, process, and standards development; oversight and insight; and technology development and transfer, in the disciplines of safety, reliability, maintainability, and quality.
SRM&QA	Safety, reliability, maintainability, and quality assurance. As used in this plan, SRM&QA refers to the professional engineering and management disciplines of safety, reliability, maintainability, and quality assurance. Risk assessment, which draws upon aspects of both safety and reliability, along with some of its own unique technology, is implicit in the use of the term SRM&QA.

S&MA Management Team Concurrence

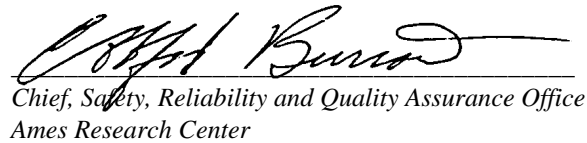
The Senior Managers of Safety and Mission Assurance throughout NASA, are committed to working with the men and women of our agency and with our stakeholders, partners, and customers to turn this Strategic Plan into reality.



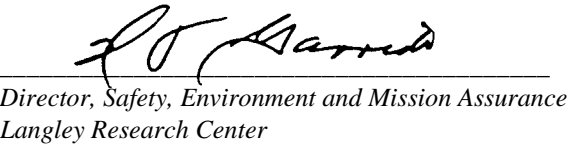
Associate Administrator for Safety and Mission Assurance



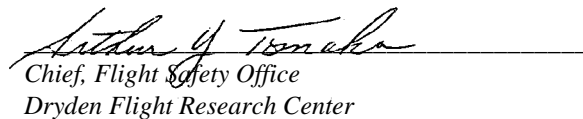
Director, Safety and Mission Assurance
Kennedy Space Center



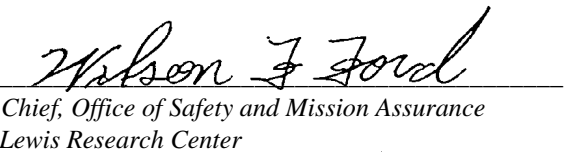
Chief, Safety, Reliability and Quality Assurance Office
Ames Research Center



Director, Safety, Environment and Mission Assurance
Langley Research Center



Chief, Flight Safety Office
Dryden Flight Research Center



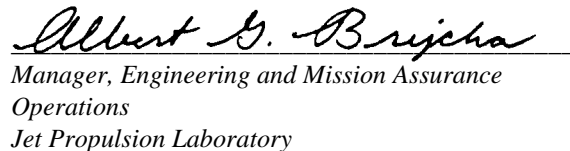
Chief, Office of Safety and Mission Assurance
Lewis Research Center



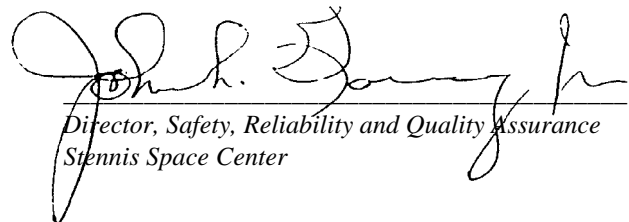
Director, Office of Flight Assurance 5-6-96
Goddard Space Flight Center



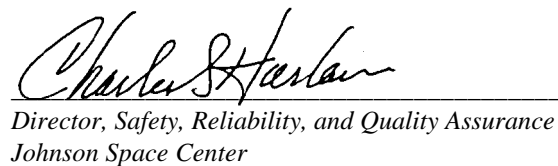
FOR
Director, Safety and Mission Assurance Office
Marshall Space Flight Center



Manager, Engineering and Mission Assurance Operations
Jet Propulsion Laboratory



Director, Safety, Reliability and Quality Assurance
Stennis Space Center



Director, Safety, Reliability, and Quality Assurance
Johnson Space Center